

Form PTO-1300 (Rev. 12-29-99)		US DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTORNEY'S DOCKET NO. <b>H 4186 PCT/US</b>	
<b>TRANSMITTAL LETTER TO THE UNITED STATES          DESIGNATED/ELECTED OFFICE (DO/EO/US)          CONCERNING A FILING UNDER 35 U.S.C. 371</b>					
INTERNATIONAL APPLICATION NO. <b>PCT/EP00/05805</b>		INTERNATIONAL FILING DATE <b>June 23, 2000</b>		U.S. APPLICATION NO. (if known see 37 C.F.R. 1.52) <div style="text-align: right; font-size: 1.2em; font-weight: bold;">10/030267</div>	
PRIORITY DATE CLAIMED <b>July 1, 1999</b>					
<b>TITLE OF INVENTION</b> <b>METHOD AND SYSTEM FOR THE PRODUCTION OF POLYURETHANE HOT-MELT TYPE ADHESIVES</b>					
<b>APPLICANT(S) FOR DO/EO/US</b> <b>Hans-Peter KOHLSTADT and Andrew NIXON</b>					
Applicant herewith submits to the United States Designated/Elected Office (EO/DO/US) the following items and other information:					
<ol style="list-style-type: none"> <li>1. <input checked="" type="checkbox"/> This is a <b>FIRST</b> submission of items concerning a filing under 35 U.S.C. 371.</li> <li>2. <input type="checkbox"/> This is a <b>SECOND</b> or <b>SUBSEQUENT</b> submission of items concerning a filing under 35 U.S.C. 371.</li> <li>3. <input type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39 (1).</li> <li>4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.</li> <li>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)).           <ol style="list-style-type: none"> <li>a. <input type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau).</li> <li>b. <input checked="" type="checkbox"/> has been transmitted by the International Bureau.</li> <li>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</li> </ol> </li> <li>6. <input checked="" type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)).</li> <li>7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))           <ol style="list-style-type: none"> <li>a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau).</li> <li>b. <input type="checkbox"/> have been transmitted by the International Bureau.</li> <li>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</li> <li>d. <input checked="" type="checkbox"/> have not been made and will not be made.</li> </ol> </li> <li>8. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</li> <li>9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</li> <li>10. <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</li> </ol>					
<b>Items 11, to 16, below concern other document(s) or information included:</b>					
<ol style="list-style-type: none"> <li>11. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.</li> <li>12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</li> <li>13. <input checked="" type="checkbox"/> A <b>FIRST</b> preliminary amendment           <ol style="list-style-type: none"> <li><input type="checkbox"/> A <b>SECOND</b> or <b>SUBSEQUENT</b> preliminary amendment.</li> </ol> </li> <li>14. <input type="checkbox"/> A substitute specification.</li> <li>15. <input type="checkbox"/> A change of power of attorney and/or address letter.</li> <li>16. <input checked="" type="checkbox"/> Other items or information:  <b>International Search Report (With Information Disclosure Citation and References)</b>  <b>Drawings - 4 sheets</b> </li> </ol>					
"Express Mail" mailing label number <u>EL 615775043 US</u>					

U.S. Application No. (if known, see 37 CFR 1.5) <b>107030267</b>	INTERNATIONAL APPLICATION NO. <b>PCT/EP00/05805</b>	ATTORNEYS DOCKET NUMBER <b>H 4186 PCT/US</b>							
17. ■ The following fees are submitted: <b>BASIC NATIONAL FEE</b> (37 CFR 1.492(a)(1)-(5)): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO.....\$1,000.00  International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO.....\$860.00  International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International search fee (37 CFR 1.445(a)(2)) paid to USPTO .....\$710.00  International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) .....  International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4).....		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="text-align: left;">CALCULATIONS</th> <th style="text-align: left;">PTO USE ONLY</th> </tr> <tr> <td colspan="2" style="height: 150px;"></td> </tr> </table>	CALCULATIONS	PTO USE ONLY					
CALCULATIONS	PTO USE ONLY								
<b>ENTER APPROPRIATE BASIC FEE AMOUNT</b> =		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: right;">\$</td> <td style="width: 50%; text-align: left;">890</td> </tr> </table>	\$	890					
\$	890								
Surcharge of \$130.00 for furnishing the oath or declaration later than + 20 + 30 months from the earliest claimed priority date 37 (CFR 1.492(e)).		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: right;">\$</td> <td style="width: 50%; text-align: left;">0</td> </tr> </table>	\$	0					
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CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE						
Total Claims	15 - 20 =	0	0 X \$18.00	\$	0				
Independent Claims	2 - 3 =	0	0 X \$80.00	\$	0				
Multiple dependent claims (s)(if applicable)			0 + \$270.00	\$	0				
<b>TOTAL OF ABOVE CALCULATIONS</b>				=	\$ 890				
Reduction of 1/2 for filing by small entity, if applicable. A Small Entity Statement must also be filed. (Note 37 CFR 1.9, 1.27, 1.28).				\$	0				
<b>SUBTOTAL</b>				=	\$ 890				
Processing fee of \$130.00 for furnishing the English translation later the + 20 + 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$	0				
<b>TOTAL NATIONAL FEE</b>				=	\$ 890				
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property				\$	0				
<b>TOTAL FEES ENCLOSED</b>				=	\$ 890				
a. * A check in the amount of \$_____ to cover the above fees is enclosed.  b. ■ Please charge my Deposit Account No. <u>01-1250</u> in the amount of <u>\$ 890.00</u> to cover the above fees. A triplicate copy of this sheet is enclosed. Order No. <u>01-0920</u> . c. ■ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. <u>01-1250</u> . A duplicate copy of this sheet is enclosed. NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.				<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Amount to be: refunded:</td> <td style="width: 50%;">\$-----</td> </tr> <tr> <td>charged:</td> <td style="text-align: right;"><b>\$ 890.00</b></td> </tr> </table>		Amount to be: refunded:	\$-----	charged:	<b>\$ 890.00</b>
Amount to be: refunded:	\$-----								
charged:	<b>\$ 890.00</b>								
SEND ALL CORRESPONDENCE TO: <b>Henkel Corporation, Law Dept.          2500 Renaissance Blvd., Suite 200          Gulph Mills, PA 19406</b>									
SIGNATURE:				<b>Glenn E. J. Murphy</b> NAME ATTORNEY FOR APPLICANT <b>33,539</b> REGISTRATION NUMBER					

10030267 10/030267

JC13 Res'd PCT/PTO 0 2 JAN 2002

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PATENT  
Docket H 4186 PCT/US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Re: PCT/EP00/05805

International Filing Date:	June 23, 2000
Priority Date:	July 1, 1999
Applicant:	KOHLSTADT, et al.
Title:	METHOD AND SYSTEM FOR THE PRODUCTION OF POLYURETHANE HOT-MELT TYPE ADHESIVES

PRELIMINARY AMENDMENT

Assistant Commissioner of Patents  
Washington, DC 20231

Please enter the amendments below before examining this  
application on the merits:

IN THE SPECIFICATION:

On page 1, insert below the title:

--CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a U.S. National Stage application  
under 35 U.S.C. § 371 of International Application No.  
PCT/EP00/05805, claiming priority under 35 U.S.C. §§ 119 and  
365 of PCT/EP00/05805, filed June 23, 2000, in the European  
Patent Office and DE 199 29 820.3, filed on July 1, 1999, in  
the German Patent Office.--

Preliminary Amendment of US National Stage for International Application PCT/EP00/05805 filed June 23, 2000

On page 2, insert between lines 21 and 22 the heading -  
-DESCRIPTION OF THE INVENTION--.

ABSTRACT:

Please add the attached abstract to the application as a separate page following the claims.

IN THE CLAIMS:

Please cancel claims 1-12 without prejudice, and add new claims 13-27:

13. A process for the production of polyurethane hot-melt adhesives from components comprising at least an isocyanate component A and a component B containing a group that is reactive to isocyanate groups, the process comprising the steps of separately dosing and melting components A and B and subsequently mixing the melted components A and B, whereby the mixed components A and B react to form the polyurethane adhesive.

14. The process of claim 13, comprising extruding one or both of the separated components A and B prior to mixing.

15. The process of claim 13, wherein the separated components are separately melted at the same time.

16. The process of claim 14, wherein the one or both of the separated components A and B are heated during extrusion.

17. The process of claim 13, comprising mixing the melted

Preliminary Amendment of US National Stage for International  
Application PCT/EP00/05805 filed June 23, 2000

components A and B with a static mixer.

18. The process of claim 14, wherein the components A and B are mixed immediately after any extrusion.

19. The process of claim 13, wherein an additional component (C) is added during mixing.

20. The process of claim 13, wherein component A comprises a monofunctional, polyfunctional, or blocked isocyanate.

21. The process claim 13, wherein component B comprises a polyol.

22. The process claim 19, wherein component C comprises one or more of an accelerator, a thixotropicizing agent, a foam-generating additive, a stabilizer, a dye, a pigment, or a molecular sieve.

23. The process of claim 19, wherein component C is added when mixing of components A and B begins.

24. The process of claim 13, wherein the components A and B are heated during mixing.

25. The process of claim 13, comprising applying the adhesive to a substrate to be bonded immediately after the adhesive is formed.

26. The process of claim 25, comprising dosing the adhesive before application to the substrate.

Preliminary Amendment of US National Stage for International  
Application PCT/EP00/05805 filed June 23, 2000

27. An apparatus for continuous production of a polyurethane hot-melt adhesive from components comprising at least an isocyanate component A and a component B containing a group that is reactive to isocyanate groups, the apparatus comprising separate extruders provided for separate extrusion of components A and B, each extruder having an outlet connected to an inlet of a mixer provided for mixing of the separately extruded components A and B.

#### REMARKS

Applicants cancel claims 1-12 without prejudice and enter new claims claims 13-27. The subject matter of the new claims is described the specification at page 2, lines 22-26, page 3, line 18 to page 4, line 6, and page 4, line 11 to page 5, line 3, as well as in the original claims. The specification has been amended to include a cross-reference to related applications and headings appropriate to U.S. practice. No new matter has been added.

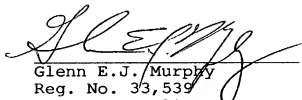
The new claims better claim the full literal and equivalent scope and breadth of subject matter disclosed in the application, notwithstanding applicants' belief that the original claims, drafted for examination in the German and European Patent Offices, would have been allowable but for minor matters of form permitted in German or European practice but objected to in the U.S.P.T.O. The new claims find support in the application independent of the original claims and therefore are not believed to constitute narrowing amendments to the original claims within the

Preliminary Amendment of US National Stage for International  
Application PCT/EP00/05805 filed June 23, 2000

holding of Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki  
Co., No. 95-1066 (Fed. Cir. Nov. 29, 2000).

Applicants respectfully request entry of this Amendment  
and examination of the application. If any fees are due to  
enter this paper that have not been accounted for, please  
charge Deposit Account No. 01-1250.

Respectfully submitted,

  
Glenn E.J. Murphy  
Reg. No. 33,539  
Attorney Applicant  
(610) 278-4926

Henkel Corporation  
Patent Department  
2500 Renaissance Blvd., Suite 200  
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Preliminary Amendment of US National Stage for International  
Application PCT/EP00/05805 filed June 23, 2000

ABSTRACT

Polyurethane hot-melt type adhesives are produced from an isocyanate (first constituent A) and at least one second constituent (B) known per se. Both constituents (A, B) are extruded separately and melted, whereupon they are mixed and reacted with each other. The invention provides a plurality of advantages over prior art.



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PATENT  
Docket H 4186

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re:           Application of           Kohlstadt et al.

International Application No. PCT/EP00/05805

International Filing Date:   June 23, 2000

Serial No. 10/030,267

Examiner: To be assigned

Filed: To be assigned

Art Unit: To be assigned

**TITLE:** METHOD AND SYSTEM FOR THE PRODUCTION OF  
POLYURETHANE HOT-MELT TYPE ADHESIVES

Box PCT  
Commissioner for Patents  
Washington, DC 20231

Attn: DO/EO/US

SUPPLEMENTAL PRELIMINARY AMENDMENT

Further to the preliminary amendment filed January 2,  
2002, please amend the application as follows:

IN THE CLAIMS:

19. (amended)       A process for the production of  
polyurethane hot-melt adhesives from components comprising  
at least an isocyanate component A and a component B  
containing a group that is reactive to isocyanate groups,  
the process comprising the steps of separately dosing and  
melting components A and B and subsequently mixing the  
melted components A and B, whereby the mixed components A  
and B react to form the polyurethane adhesive.

20. (amended)       The process of claim 19, comprising

extruding one or both of the separated components A and B prior to mixing.

21. (amended) The process of claim 19, wherein the separated components are separately melted at the same time.

22. (amended) The process of claim 20, wherein the one or both of the separated components A and B are heated during extrusion.

23. (amended) The process of claim 19, comprising mixing the melted components A and B with a static mixer.

24. (amended) The process of claim 20, wherein the components A and B are mixed immediately after any extrusion.

25. (amended) The process of claim 19, wherein an additional component (C) is added during mixing.

26. (amended) The process of claim 19, wherein component A comprises a monofunctional, polyfunctional, or blocked isocyanate.

27. (amended) The process of claim 19, wherein component B comprises a polyol.

28. (amended) The process of claim 25, wherein component C comprises one or more of an accelerator, a thixotropicizing agent, a foam-generating additive, a stabilizer, a dye, a pigment, or a molecular sieve.

29. (amended) The process of claim 25, wherein component C is added when mixing of components A and B begins.

30. (amended) The process of claim 19, wherein the components A and B are heated during mixing.

31. (amended) The process of claim 19, comprising applying the adhesive to a substrate to be bonded immediately after the adhesive is formed.

32. (amended) The process of claim 31, comprising dosing the adhesive before application to the substrate.

33. (amended) An apparatus for continuous production of a polyurethane hot-melt adhesive from components comprising at least an isocyanate component A and a component B containing a group that is reactive to isocyanate groups, the apparatus comprising separate extruders provided for separate extrusion of components A and B, each extruder having an outlet connected to an inlet of a mixer provided for mixing of the separately extruded components A and B.

Please add new claims 34-38:

34. The apparatus of claim 33, wherein the extruders are heatable.

35. The apparatus of claim 33, wherein the mixer is a static mixer.

36. The apparatus of claim 33, wherein the mixer is

heatable.

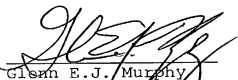
37. The apparatus of claim 33, wherein the outlets of the extruders are connected directly or by heated pipes to the inlet of the static mixer.

38. The apparatus of claim 33, wherein the outlet of the mixer is connected to the inlet of an adhesives application through a dosing apparatus.

REMARKS

Claims 13-27 have been renumbered as claims 19-33, and new claims 34-38 have been added based on claims 13-18 of the application as originally filed. No new matter has been added. Should any fees be due that have not been accounted for in order to have this paper entered and examination of the application continued, including any fees for extensions of time under 37 C.F.R. § 1.136, please charge Deposit Account No. 01-1250.

Respectfully submitted,

  
Glenn E.J. Murphy  
Reg. No. 33,539  
Attorney for Applicant  
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Gulph Mills, PA 19406  
GEM/aa

CLAIMS AMENDED JUNE 28, 2002, SHOWING AMENDMENTS

19[13]. A process for the production of polyurethane hot-melt adhesives from components comprising at least an isocyanate component A and a component B containing a group that is reactive to isocyanate groups, the process comprising the steps of separately dosing and melting components A and B and subsequently mixing the melted components A and B, whereby the mixed components A and B react to form the polyurethane adhesive.

20[14]. The process of claim 19[13], comprising extruding one or both of the separated components A and B prior to mixing.

21[15]. The process of claim 19[13], wherein the separated components are separately melted at the same time.

22[16]. The process of claim 20[14], wherein the one or both of the separated components A and B are heated during extrusion.

23[17]. The process of claim 19[13], comprising mixing the melted components A and B with a static mixer.

24[18]. The process of claim 20[14], wherein the components A and B are mixed immediately after any extrusion.

25[19]. The process of claim 19[13], wherein an additional component (C) is added during mixing.

26[20]. The process of claim 19[13], wherein component A comprises a monofunctional, polyfunctional, or blocked isocyanate.

27[21]. The process of claim 19[13], wherein component B comprises a polyol.

28[22]. The process of claim 25[19], wherein component C comprises one or more of an accelerator, a thixotropizing agent, a foam-generating additive, a stabilizer, a dye, a pigment, or a molecular sieve.

29[23]. The process of claim 25[19], wherein component C is added when mixing of components A and B begins.

30[24]. The process of claim 19[13], wherein the components A and B are heated during mixing.

31[25]. The process of claim 19[13], comprising applying the adhesive to a substrate to be bonded immediately after the adhesive is formed.

32[26]. The process of claim 31[25], comprising dosing the adhesive before application to the substrate.

33[27]. An apparatus for continuous production of a polyurethane hot-melt adhesive from components comprising at least an isocyanate component A and a component B containing a group that is reactive to isocyanate groups, the apparatus comprising separate extruders provided for separate extrusion of components A and B, each extruder

having an outlet connected to an inlet of a mixer provided for mixing of the separately extruded components A and B.

## Method and System for the Production of Polyurethane Hot-melt Type Adhesives

This invention relates to a process for the production, more particularly the continuous production, of polyurethane hotmelt adhesives from an isocyanate (first component A) and at least a second component B known per se.

- 5 Hotmelt adhesives, also known as hotmelts, are based inter alia on polyurethanes, are applied in the molten state and set particularly quickly on subsequent cooling. Polyurethanes are adhesive systems specifically composed of polyetherdiols/polyester diols (component B) and diisocyanates. The highly variable hardening of polyurethane adhesives is  
10 attributable to a second diol component or to atmospheric moisture. Polyurethanes form high-strength, elastic bonds which are capable of withstanding dynamic loads and changes in temperature.

- The process mentioned above is known from a prospectus of Reinhard Düspohl Maschinenbau GmbH which describes a process for the  
15 production and immediate application of polyurethane hotmelt adhesives. Granules of the two components A and B are delivered to a mixing zone from two separate hoppers by separately driven metering screws. From the mixing zone, the granules pass into an extruder where they are heated to softening point by compression and frictional heat and processed to a  
20 homogeneous adhesive composition. The extruder may be followed by application systems for hotmelt adhesive.

- However, despite its undoubted advantages, this process is also attended by a number of disadvantages. The melting temperature is applied solely by the drive energy of the extruder. Accordingly, subsequent  
25 heating or cooling is necessary in order to obtain the required processing temperatures and viscosities. To this end, the adhesive has to be brought



to the processing temperature in intermediate tanks which have to be blanketed with inert gas to prevent premature hardening of the adhesive. The cleaning of the intermediate tank with a special cleaner is another disadvantage.

- 5       After each stoppage, the machine, more particularly the extruder, has to be cleaned. The isocyanate constituents present in the machine have to be completely neutralized, i.e. reacted off, and removed.

- Any water present in component B leads to a chemical reaction with the isocyanate during which carbon dioxide is formed and leads to foaming.  
10     In addition, amines by which crosslinking of the adhesive is accelerated, possibly undesirably, are also formed.

- Further disadvantages include the high energy costs and the significant losses of adhesive used to "rinse" the machine and the relatively long dwell times of the adhesive mixtures at elevated temperatures. The  
15     relatively large amount of adhesive in the machine is also unfavorable. In addition, modified adhesive systems, for example accelerated, thixotropizing or foaming systems, can only be produced and processed to a limited extent, if at all.

- Accordingly, the problem addressed by the present invention was to  
20     avoid the above-mentioned disadvantages in the process mentioned at the beginning.

- According to the invention, the solution to this problem for the process mentioned at the beginning is characterized in that the two components (A,B) are dosed and transported, preferably extruded, and  
25     melted, more particularly at the same time, separately from one another and only then are mixed and allowed to react.

      In this way, improved temperature control is achieved during the melting of components A and B in the separate extruders.

- The already melted components A and B can be mixed considerably  
30     more effectively. There is no longer any need for an intermediate tank to

bring the adhesive mixture to the required processing temperature. No adhesive at all is present in the extruders, only the components required for producing the adhesive. These components only react with one another in the mixer. There is no need to use inert gas. In the event of an interruption  
5 in the process, only the mixer and not the extruder need be cleaned, resulting in smaller losses of adhesive than in the prior art. Should the adhesive harden in the machine, only the mixer and not the extruder(s) need be replaced so that the break in operation is minor compared with the known process. Considerably smaller quantities of prepared adhesive are  
10 present in the machine and the exposure of the adhesive to heat before it is processed is considerably less. Relatively constant viscosities and consistencies are achieved. Finally, modified adhesive systems in particular, for example non-accelerated to highly accelerated, non-foaming to high-foaming and/or non-thixotropicizing to highly thixotropicizing  
15 systems, can also be produced. Another advantage is that water present in component B evaporates before this component comes into contact with the isocyanate.

In another embodiment of the invention, the components (A,B) are additionally heated during extrusion to enable the desired adhesive  
20 temperature to be adjusted as required.

In one advantageous embodiment of the invention, a static mixer is used for mixing.

In another embodiment of the invention, the components are mixed immediately after extrusion.

25 In another advantageous embodiment, an additional component (C) may be added during mixing.

Any isocyanate suitable for the production of adhesives may be used as the first component A. In one particular embodiment, this component is a mono- or polyfunctional or blocked isocyanate.

30 The second component B may be selected from any available

formulations known per se. In one particular embodiment, component B is a substance containing at least two functional groups reactive to isocyanate groups, more particularly a polyol. Modifications of the second component may also be used to achieve corresponding properties, for example thixotropy, foaming, accelerated hardening, etc., of the final adhesives.

The quantity ratio between components A and B should preferably be selected so that either an excess of isocyanate groups is present or equivalent ratios are present. The excess of isocyanate groups can react with moisture.

The additional component C already mentioned may be used as another option for special applications. In one embodiment, the additional component (C) is an accelerator, a thixotropicizing agent, a foam-generating additive, a stabilizer, a dye and/or pigment and/or a molecular sieve for binding residual water.

In another embodiment, the additional component is added right at the beginning of the mixing of the first and second components.

In another advantageous embodiment, the components to be mixed are heated during mixing to enable the temperature of the adhesive produced to be adjusted as required without having to resort to the drive energy of the extruder for heating.

Finally, in another favorable embodiment, the adhesive is applied to the substrate to be bonded immediately after production either directly or by means of an application system known per se, optionally with a dosing unit in between. Relevant examples are discussed in detail in the following.

The present invention also relates to a machine for the continuous production of polyurethane hotmelt adhesives from a first component and at least a second component comprising at least one extruder and a mixer connected thereto. This machine is already known from the Düspohl prospectus cited above.

The solution to the problem stated above is characterized in that separate extruders are provided for the first and second components and in that the outlets of the extruders are connected to the inlet of the mixer.

In one preferred embodiment, the extruders are heatable.

- 5 In another advantageous embodiment, the mixer is a static mixer and, more particularly, is heatable.

Further advantageous embodiments can be found in the other subsidiary claims relating to the machine according to the invention.

- 10 Examples of embodiment of the invention are described in detail in the following with reference to the accompanying drawings, wherein:

Figure 1 shows a machine according to the invention connected to an adhesive gun.

Figure 2 is a longitudinal section through the static mixer used in the machine shown in Fig. 1.

- 15 Figure 3 shows a machine corresponding to Fig. 1 connected to a slot-like adhesive coating unit.

Figure 4 shows a machine corresponding to Fig. 1 with an additional adhesive dosing station.

- 20 In all the drawings, the same reference numerals have the same meanings and, accordingly, may only be explained once.

- The machine shown in Fig. 1 comprises an extruder 1 with a drive 3 for component A (isocyanate), an extruder 2 with a drive 4 for component B, a static mixer 5, a feeder (not shown) for delivering component C to the mixer 5 and a control unit - again not shown. The temperature of the adhesive or the components and the rotational speeds of the extruders are controlled and displayed by the control unit. Components A and B are delivered from the outlets of the extruders 1 and 2 through heated pipes 6 to the corresponding inlets of the static mixer 5. Shutoff valves in the pipes 6 may be used for cleaning the machine. The valves 7 may be manually or pneumatically operated.
- 25
- 30

Components A and B are delivered to the respective extruders 1, 2 from feed hoppers 8. The extruders 1, 2 are heatable.

In the machine shown in Fig. 1, the static mixer 5 is directly connected to an adhesive application gun 9 known per se. Here, the final  
5 adhesive may either be removed in the form of drops (granules) or directly applied to the substrate to be bonded or delivered to an adhesive application roller connected to the application gun.

Figure 2 is a longitudinal section through the static mixer 5 which is continuously heatable and comprises a temperature control. The housing  
10 consists of a steel tube 10 provided on its inside with an anti-adhesion coating. The mixing element 11, the so-called internals, is provided with the same coating or with a corresponding coating. The mixing element 11 may consist, for example, of plastic (polyaramide), ceramic or steel.

The static mixer 5 enables component A to be mixed with  
15 component B to obtain a homogeneous end product. The physical properties of the end product may be influenced by addition of a component C. The mixing element 11 can be removed and replaced easily, quickly and conveniently for cleaning purposes. To this end, the steel tube 10 is provided at its lower end (in Fig. 2) with a screwed-in  
20 closure 12.

Figure 3 shows a machine similar to that illustrated in Fig. 1. In Fig. 3, however, the mixer 5 is connected to an adhesive application unit 13 with a slot nozzle. This variant is of advantage when the adhesive does have to be applied in exact amounts.

Finally, Fig. 4 shows a system similar to that illustrated in Figs. 1 and  
25 3. In Fig. 4, however, the static mixer 5 is connected to a gear pump dosing station 14 by which the quantities of adhesive to be applied can be exactly measured. The adhesive issues from the nozzle 15.

The end products to be processed are moisture-curing polyurethane  
30 adhesives which, in addition, may be specially modified. For example, they

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can be quick-curing, thixotropicizing and/or foaming. Preferred applications for these adhesives include, for example, surface lamination of various substrates, sandwich elements, caravan construction, garage door assembly, mobile home construction, sheathing of wide-section profiles (for  
5 example continuous manufacture of doors), three-dimensional lamination and the like.

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**List of reference numerals:**

- 1 extruder
- 2 extruder
- 3 drive
- 4 drive
- 5 mixer
- 6 pipe
- 7 shutoff valve
- 8 feed hopper
- 9 adhesive application gun
- 10 steel tube
- 11 mixing element
- 12 closure
- 13 adhesive applicator
- 14 dosing gear pump station
- 15 nozzle
  
- A first component
- B second component
- C additional component

**CLAIMS**

1. A process for the production, more particularly the continuous production, of polyurethane hotmelt adhesives from an isocyanate (first component A) and at least a second component (B) known per se,  
5 characterized in that the two components (A,B) are dosed and transported, preferably extruded, and melted, more particularly at the same time, separately from one another and only then are mixed and allowed to react.
2. A process as claimed in claim 1, characterized in that the components (A, B) are additionally heated during extrusion.
- 10 3. A process as claimed in any of the preceding claims, characterized in that a static mixer is used for mixing.
4. A process as claimed in any of the preceding claims, characterized in that the components (A, B) are mixed immediately after extrusion.
5. A process as claimed in any of the preceding claims, characterized  
15 in that an additional component (C) is added during mixing.
6. A process as claimed in any of the preceding claims, characterized in that the first component (A) is a mono- or polyfunctional or blocked isocyanate.
7. A process as claimed in any of the preceding claims, characterized  
20 in that the second component (B) is a substance containing at least two functional groups reactive to isocyanate groups, more particularly a polyol.
8. A process as claimed in any of claims 5 to 7, characterized in that the additional component (C) is an accelerator, a thixotropicizing agent, a foam-generating additive, a stabilizer, a dye and/or pigment and/or a  
25 molecular sieve for binding residual water.
9. A process as claimed in any of claims 5 to 8, characterized in that the additional component (C) is added right at the beginning of the mixing of the first component (A) and second component (B).
10. A process as claimed in any of the preceding claims, characterized  
30 in that the components to be mixed are heated during mixing.



11. A process as claimed in any of the preceding claims, characterized in that the adhesive is applied to the substrate to be bonded immediately after production either directly or by means of an application system known per se, optionally with a dosing unit in between.
- 5 12. A machine for the continuous production of polyurethane hotmelt adhesives from a first component (A) and at least a second component (B) comprising at least one extruder (1, 2) and a mixer (5) connected thereto, characterized in that separate extruders (1, 2) are provided for the first and second components (A, B) and in that the outlets of the extruders (1,2) are
- 10 connected to the inlet of the mixer (5).

Method and System for the Production of Polyurethane Hot-melt  
Type Adhesives

This invention relates to a process for the production, more particularly the continuous production, of polyurethane hotmelt adhesives from an isocyanate (first component A) and at least a second component B known per se.

- 5 Hotmelt adhesives, also known as hotmelts, are based inter alia on polyurethanes, are applied in the molten state and set particularly quickly on subsequent cooling. Polyurethanes are adhesive systems specifically composed of polyetherdiols/polyester diols (component B) and diisocyanates. The highly variable hardening of polyurethane adhesives is
- 10 attributable to a second diol component or to atmospheric moisture. Polyurethanes form high-strength, elastic bonds which are capable of withstanding dynamic loads and changes in temperature.

- The process mentioned above is known from a prospectus of Reinhard Düsppohl Maschinenbau GmbH which describes a process for the
- 15 production and immediate application of polyurethane hotmelt adhesives. Granules of the two components A and B are delivered to a mixing zone from two separate hoppers by separately driven metering screws. From the mixing zone, the granules pass into an extruder where they are heated to softening point by compression and frictional heat and processed to a
- 20 homogeneous adhesive composition. The extruder may be followed by application systems for hotmelt adhesive.

- However, despite its undoubted advantages, this process is also attended by a number of disadvantages. The melting temperature is applied solely by the drive energy of the extruder. Accordingly, subsequent
- 25 heating or cooling is necessary in order to obtain the required processing temperatures and viscosities. To this end, the adhesive has to be brought

to the processing temperature in intermediate tanks which have to be blanketed with inert gas to prevent premature hardening of the adhesive. The cleaning of the intermediate tank with a special cleaner is another disadvantage.

- 5           After each stoppage, the machine, more particularly the extruder, has to be cleaned. The isocyanate constituents present in the machine have to be completely neutralized, i.e. reacted off, and removed.

Any water present in component B leads to a chemical reaction with the isocyanate during which carbon dioxide is formed and leads to foaming.

- 10          In addition, amines by which crosslinking of the adhesive is accelerated, possibly undesirably, are also formed.

- Further disadvantages include the high energy costs and the significant losses of adhesive used to "rinse" the machine and the relatively long dwell times of the adhesive mixtures at elevated temperatures. The relatively large amount of adhesive in the machine is also unfavorable. In addition, modified adhesive systems, for example accelerated, thixotropicizing or foaming systems, can only be produced and processed to a limited extent, if at all.

- 20          Accordingly, the problem addressed by the present invention was to avoid the above-mentioned disadvantages in the process mentioned at the beginning.

- According to the invention, the solution to this problem for the process mentioned at the beginning is characterized in that the two components (A,B) are dosed and transported, preferably extruded, and melted, more particularly at the same time, separately from one another and only then are mixed and allowed to react.

In this way, improved temperature control is achieved during the melting of components A and B in the separate extruders.

- 30          The already melted components A and B can be mixed considerably more effectively. There is no longer any need for an intermediate tank to

bring the adhesive mixture to the required processing temperature. No adhesive at all is present in the extruders, only the components required for producing the adhesive. These components only react with one another in the mixer. There is no need to use inert gas. In the event of an interruption  
5 in the process, only the mixer and not the extruder need be cleaned, resulting in smaller losses of adhesive than in the prior art. Should the adhesive harden in the machine, only the mixer and not the extruder(s) need be replaced so that the break in operation is minor compared with the known process. Considerably smaller quantities of prepared adhesive are  
10 present in the machine and the exposure of the adhesive to heat before it is processed is considerably less. Relatively constant viscosities and consistencies are achieved. Finally, modified adhesive systems in particular, for example non-accelerated to highly accelerated, non-foaming to high-foaming and/or non-thixotropicizing to highly thixotropicizing  
15 systems, can also be produced. Another advantage is that water present in component B evaporates before this component comes into contact with the isocyanate.

In another embodiment of the invention, the components (A,B) are additionally heated during extrusion to enable the desired adhesive  
20 temperature to be adjusted as required.

In one advantageous embodiment of the invention, a static mixer is used for mixing.

In another embodiment of the invention, the components are mixed immediately after extrusion.

25 In another advantageous embodiment, an additional component (C) may be added during mixing.

Any isocyanate suitable for the production of adhesives may be used as the first component A. In one particular embodiment, this component is a mono- or polyfunctional or blocked isocyanate.

30 The second component B may be selected from any available

formulations known per se. In one particular embodiment, component B is a substance containing at least two functional groups reactive to isocyanate groups, more particularly a polyol. Modifications of the second component may also be used to achieve corresponding properties, for example thixotropy, foaming, accelerated hardening, etc., of the final adhesives.

The quantity ratio between components A and B should preferably be selected so that either an excess of isocyanate groups is present or equivalent ratios are present. The excess of isocyanate groups can react with moisture.

The additional component C already mentioned may be used as another option for special applications. In one embodiment, the additional component (C) is an accelerator, a thixotropizing agent, a foam-generating additive, a stabilizer, a dye and/or pigment and/or a molecular sieve for binding residual water.

In another embodiment, the additional component is added right at the beginning of the mixing of the first and second components.

In another advantageous embodiment, the components to be mixed are heated during mixing to enable the temperature of the adhesive produced to be adjusted as required without having to resort to the drive energy of the extruder for heating.

Finally, in another favorable embodiment, the adhesive is applied to the substrate to be bonded immediately after production either directly or by means of an application system known per se, optionally with a dosing unit in between. Relevant examples are discussed in detail in the following.

The present invention also relates to a machine for the continuous production of polyurethane hotmelt adhesives from a first component and at least a second component comprising at least one extruder and a mixer connected thereto. This machine is already known from the Düspohl prospectus cited above.

The solution to the problem stated above is characterized in that separate extruders are provided for the first and second components and in that the outlets of the extruders are connected to the inlet of the mixer.

In one preferred embodiment, the extruders are heatable.

- 5 In another advantageous embodiment, the mixer is a static mixer and, more particularly, is heatable.

Further advantageous embodiments can be found in the other subsidiary claims relating to the machine according to the invention.

- 10 Examples of embodiment of the invention are described in detail in the following with reference to the accompanying drawings, wherein:

Figure 1 shows a machine according to the invention connected to an adhesive gun.

Figure 2 is a longitudinal section through the static mixer used in the machine shown in Fig. 1.

- 15 Figure 3 shows a machine corresponding to Fig. 1 connected to a slot-like adhesive coating unit.

Figure 4 shows a machine corresponding to Fig. 1 with an additional adhesive dosing station.

- 20 In all the drawings, the same reference numerals have the same meanings and, accordingly, may only be explained once.

- The machine shown in Fig. 1 comprises an extruder 1 with a drive 3 for component A (isocyanate), an extruder 2 with a drive 4 for component B, a static mixer 5, a feeder (not shown) for delivering component C to the mixer 5 and a control unit - again not shown. The temperature of the adhesive or the components and the rotational speeds of the extruders are controlled and displayed by the control unit. Components A and B are delivered from the outlets of the extruders 1 and 2 through heated pipes 6 to the corresponding inlets of the static mixer 5. Shutoff valves in the pipes 6 may be used for cleaning the machine. The valves 7 may be manually or pneumatically operated.
- 25
- 30

Components A and B are delivered to the respective extruders 1, 2 from feed hoppers 8. The extruders 1, 2 are heatable.

In the machine shown in Fig. 1, the static mixer 5 is directly connected to an adhesive application gun 9 known per se. Here, the final  
5 adhesive may either be removed in the form of drops (granules) or directly applied to the substrate to be bonded or delivered to an adhesive application roller connected to the application gun.

Figure 2 is a longitudinal section through the static mixer 5 which is continuously heatable and comprises a temperature control. The housing  
10 consists of a steel tube 10 provided on its inside with an anti-adhesion coating. The mixing element 11, the so-called internals, is provided with the same coating or with a corresponding coating. The mixing element 11 may consist, for example, of plastic (polyaramide), ceramic or steel.

The static mixer 5 enables component A to be mixed with  
15 component B to obtain a homogeneous end product. The physical properties of the end product may be influenced by addition of a component C. The mixing element 11 can be removed and replaced easily, quickly and conveniently for cleaning purposes. To this end, the steel tube 10 is provided at its lower end (in Fig. 2) with a screwed-in  
20 closure 12.

Figure 3 shows a machine similar to that illustrated in Fig. 1. In Fig. 3, however, the mixer 5 is connected to an adhesive application unit 13 with a slot nozzle. This variant is of advantage when the adhesive does have to be applied in exact amounts.

25 Finally, Fig. 4 shows a system similar to that illustrated in Figs. 1 and 3. In Fig. 4, however, the static mixer 5 is connected to a gear pump dosing station 14 by which the quantities of adhesive to be applied can be exactly measured. The adhesive issues from the nozzle 15.

The end products to be processed are moisture-curing polyurethane  
30 adhesives which, in addition, may be specially modified. For example, they

can be quick-curing, thixotropicizing and/or foaming. Preferred applications for these adhesives include, for example, surface lamination of various substrates, sandwich elements, caravan construction, garage door assembly, mobile home construction, sheathing of wide-section profiles (for  
5 example continuous manufacture of doors), three-dimensional lamination and the like.



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**List of reference numerals:**

- 1 extruder
- 2 extruder
- 3 drive
- 4 drive
- 5 mixer
- 6 pipe
- 7 shutoff valve
- 8 feed hopper
- 9 adhesive application gun
- 10 steel tube
- 11 mixing element
- 12 closure
- 13 adhesive applicator
- 14 dosing gear pump station
- 15 nozzle
  
- A first component
- B second component
- C additional component

**CLAIMS**

1. A process for the production, more particularly the continuous production, of polyurethane hotmelt adhesives from an isocyanate (first component A) and at least a second component (B) known per se,  
5 characterized in that the two components (A,B) are dosed and transported, preferably extruded, and melted, more particularly at the same time, separately from one another and only then are mixed and allowed to react.
2. A process as claimed in claim 1, characterized in that the components (A, B) are additionally heated during extrusion.
- 10 3. A process as claimed in any of the preceding claims, characterized in that a static mixer is used for mixing.
4. A process as claimed in any of the preceding claims, characterized in that the components (A, B) are mixed immediately after extrusion.
5. A process as claimed in any of the preceding claims, characterized  
15 in that an additional component (C) is added during mixing.
6. A process as claimed in any of the preceding claims, characterized in that the first component (A) is a mono- or polyfunctional or blocked isocyanate.
7. A process as claimed in any of the preceding claims, characterized  
20 in that the second component (B) is a substance containing at least two functional groups reactive to isocyanate groups, more particularly a polyol.
8. A process as claimed in any of claims 5 to 7, characterized in that the additional component (C) is an accelerator, a thixotropicizing agent, a foam-generating additive, a stabilizer, a dye and/or pigment and/or a  
25 molecular sieve for binding residual water.
9. A process as claimed in any of claims 5 to 8, characterized in that the additional component (C) is added right at the beginning of the mixing of the first component (A) and second component (B).
10. A process as claimed in any of the preceding claims, characterized  
30 in that the components to be mixed are heated during mixing.

11. A process as claimed in any of the preceding claims, characterized in that the adhesive is applied to the substrate to be bonded immediately after production either directly or by means of an application system known per se, optionally with a dosing unit in between.
- 5 12. A machine for the continuous production of polyurethane hotmelt adhesives from a first component (A) and at least a second component (B) comprising at least one extruder (1, 2) and a mixer (5) connected thereto, characterized in that separate extruders (1, 2) are provided for the first and second components (A, B) and in that the outlets of the extruders (1,2) are
- 10 connected to the inlet of the mixer (5).
13. A machine as claimed in claim 12, characterized in that the extruders (1,2) are heatable.
14. A machine as claimed in claim 12 or 13, characterized in that the mixer is a static mixer and, more particularly, is heatable.
- 15 15. A machine as claimed in claim 12 or 14, characterized in that the outlets of the extruders (1,2) are connected directly or by heated pipes (6) to the inlet of the static mixer (5).
16. A machine as claimed in claim 12 or 15, characterized in that the mixer (5) has an additional inlet for the introduction of an additional
- 20 component (C).
17. A machine as claimed in the previous claim, characterized in that the additional inlet is arranged near the inlets for the first two components (A,B).
18. A machine as claimed in claim 12 or 17, characterized in that the
- 25 outlet of the mixer (5) is connected to the inlet of an adhesives application unit (9,13), if possible through a dosing apparatus (14).

(12) NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES  
PATENTWESENS (PCT) VERÖFFENTLICHTE INTERNATIONALE ANMELDUNG

(19) Weltorganisation für geistiges Eigentum  
Internationales Büro



(43) Internationales Veröffentlichungsdatum  
11. Januar 2001 (11.01.2001)

PCT

(10) Internationale Veröffentlichungsnummer  
**WO 01/02456 A1**

(51) Internationale Patentklassifikation: C08G 18/08,  
C09J 175/04, B29B 7/32

(21) Internationales Aktenzeichen: PCT/EP00/05805

(22) Internationales Anmeldedatum:  
23. Juni 2000 (23.06.2000)

(25) Einreichungssprache: Deutsch

(26) Veröffentlichungssprache: Deutsch

(30) Angaben zur Priorität:  
199 29 820.3 1. Juli 1999 (01.07.1999) DE

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(81) Bestimmungsstaaten (national): AU, BR, CA, CN, CZ,  
HU, JP, KR, NO, NZ, PL, RU, SI, SK, TR, US.

(84) Bestimmungsstaaten (regional): europäisches Patent (AT,  
BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,  
NL, PT, SE).

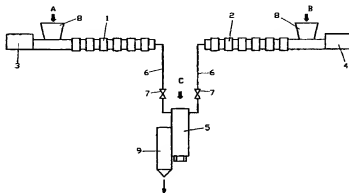
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Frist, Veröffentlichung wird wiederholt, falls Änderungen  
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Zur Erklärung der Zweibuchstaben-Codes, und der anderen  
Abkürzungen wird auf die Erklärungen ("Guidance Notes on  
Codes and Abbreviations") am Anfang jeder regulären Ausgabe  
der PCT-Gazette verwiesen.

(54) Title: METHOD AND SYSTEM FOR THE PRODUCTION OF POLYURETHANE HOT-MELT TYPE ADHESIVES

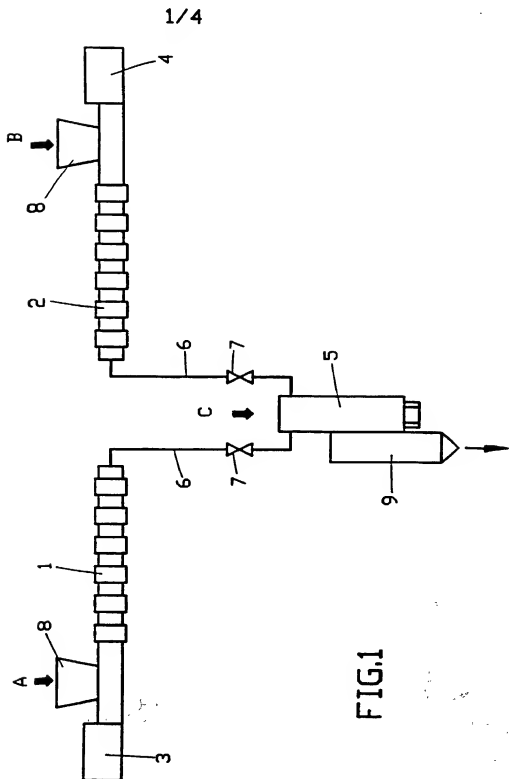
(54) Bezeichnung: VERFAHREN UND ANLAGE ZUM HERSTELLEN VON POLYURETHAN-SCHMELZKLEBSTOFFEN



(57) Abstract: Polyurethane hot-melt type adhesives are produced from an isocyanate (first constituent A) and at least one second constituent (B) known per se. Both constituents (A, B) are extruded separately and melted, whereupon they are mixed and reacted with each other. The invention provides a plurality of advantages over prior art.

(57) Zusammenfassung: Polyurethan-Schmelzklebstoffe werden aus einem Isocyanat (erste Komponente A) und mindestens einer zweiten, an sich bekannten Komponente (B) hergestellt. Man extrudiert beide Komponenten (A, B) getrennt voneinander, schmilzt diese auf und mischt sie erst dann und läßt sie reagieren. Eine Vielzahl von Vorteilen gegenüber dem Stand der Technik wird erreicht.

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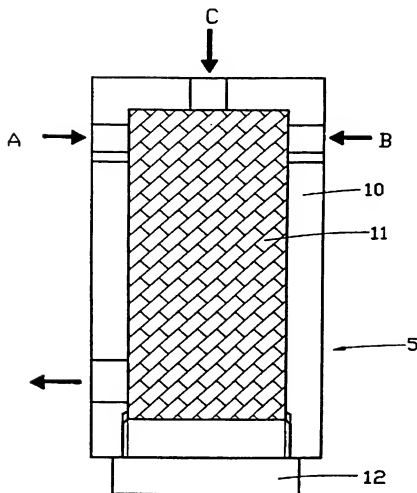


FIG.2

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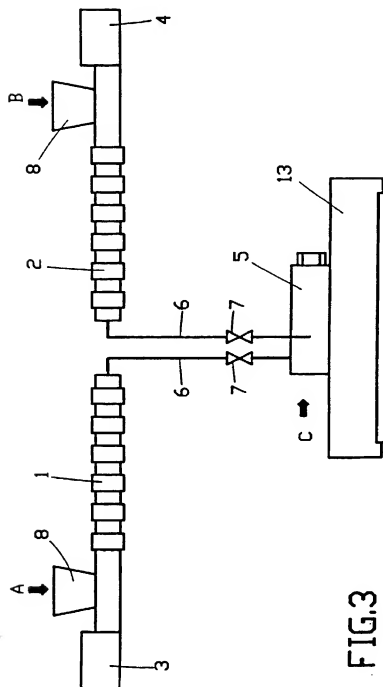
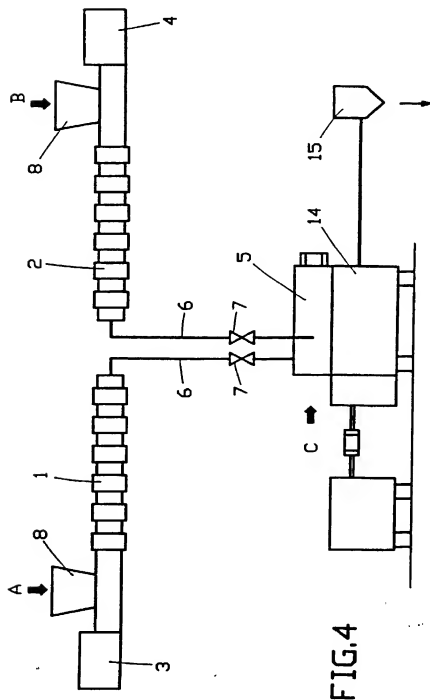


FIG. 3

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**DECLARATION****Page 2**

I hereby claim the benefit under Title 35, United States Code §120 of any United States application(s), or §365 of any PCT International application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code §112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations §1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

U.S. Parent Application Number	PCT Parent Number	Parent Filing Date (MM/DD/YYYY)	Parent Patent Number (if applicable)
	PCT/EP00/05805	6/23/2000	

☐ Additional U.S. or PCT International application numbers are listed on a supplemental priority sheet attached hereto.

As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith:

☐ Firm Name  Customer Number  or label

OR

☒ List Attorney(s) and/or agent(s) name and registration number below:

Name	Registration Number	Name	Registration Number
Wayne C. Jaeschke	21,062		
Glenn E. J. Murphy	33,539		
Stephen D. Harper	33,243		
Kimberly R. Hild	39,224		

☐ Additional attorney(s) and/or agent(s) named on a supplemental sheet attached hereto.

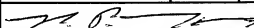
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Address	Henkel Corporation				
Address	2500 Renaissance Blvd, Suite 200				
City	Gulph Mills	State	PA	Zip	19406
Country	USA	Telephone	610-278-4926	Fax	610-278-6548

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

**Name of Sole or First Inventor:** ☐ A petition has been filed for this unsigned inventor

Given Name	<b>Hans-Peter</b>	Middle Initial		Family Name	<b>KOHLSTADT</b>	Suffix e.g. Jr.	
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Inventor's Signature		Date	<b>23.02.2002</b>
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Residence: City	<b>Velbert</b>	State		Country	<b>Germany</b>	Citizenship	<b>Germany</b>
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Post Office Address **Virchowstrasse 16a**

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City	<b>42549 Velbert</b>	State		Zip		Country	<b>Germany</b>	Applicant Authority	
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☒ Additional inventors are being named on supplemental sheet(s) attached hereto



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10030227 1370102

PTO/SB/01 (6-95)

Approved for use through: 10/31/98 OMB 0651-0032

Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

0010/PTO Rev. 6/95	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket Number First Named Inventor	H 4186 PCT/US  KOHLESTADT, Hans-Peter	
<b>DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION</b>		<b>COMPLETE IF KNOWN</b>		
		Application Number	10/030,267	
		Filing Date		
		Group Art Unit		
<input type="checkbox"/> Declaration Submitted with Initial Filing OR <input checked="" type="checkbox"/> Declaration Submitted after Initial Filing		Examiner Name		

As a below named inventor, I hereby declare that:  
My residence, post office address, and citizenship are as stated below next to my name.  
I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**METHOD AND SYSTEM FOR THE PRODUCTION OF POLYURETHANE HOT-MELT TYPE ADHESIVES**

*(Title of the invention)*

the specification of which

☐ is attached hereto

OR

☒ was filed on (MM/DD/YYYY) 6/23/2000 as United States Application Number or PCT International

Application Number PCT/EP00/05805 and was amended on (MM/DD/YYYY)  (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37 Code of Federal Regulations, § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(e) of any PCT International application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority	Certified Copy Attached?	
			Not Claimed	YES	NO
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			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

☐ Additional foreign application numbers are listed on a supplemental priority sheet attached hereto:

I hereby claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below:

Application Number(s)	Filing Date (MM/DD/YYYY)	Additional provisional application numbers are listed on a supplemental priority sheet attached hereto.

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**DECLARATION****ADDITIONAL INVENTOR(S)  
Supplemental Sheet****Name of Additional Joint Inventor, if any:**☐ A petition has been filed for this unsigned inventor

Given Name	<b>Andrew</b>	Middle Initial		Family Name	<b>NIXON</b>	Suffix e.g. Jr.	
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Inventor's Signature	<i>Coekun</i>	Date	<b>26.02.2002</b>
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Residence: City	<b>Meerbusch</b>	State		Country	<b>Germany</b>	Citizenship	<b>United Kingdom</b>
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Post Office Address **Azaleenweg 28**

Post Office Address

City	<b>40670 Meerbusch</b>	State		Zip		Country	<b>Germany</b>	Applicant Authority	
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**Name of Additional Joint Inventor, if any:**☐ A petition has been filed for this unsigned inventor

Given Name		Middle Initial		Family Name		Suffix e.g. Jr.	
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Inventor's Signature		Date	
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Residence: City		State		Country		Citizenship	
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Post Office Address

Post Office Address

City		State		Zip		Country		Applicant Authority	
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Inventor's Signature		Date	
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Inventor's Signature		Date	
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Residence: City		State		Country		Citizenship	
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Post Office Address

City		State		Zip		Country		Applicant Authority	
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☐ Additional inventors are being named on supplemental sheet(s) attached hereto



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Approved for use through: 10/31/98 OMB 0651-0032

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Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

0010/PTO Rev. 6/95	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket Number	H 4186 PCT/US			
<b>DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION</b>		First Named Inventor	KOHLSTADT, Hans-Peter			
		COMPLETE IF KNOWN				
		Application Number	10/030,267			
		Filing Date				
		Group Art Unit				
<input type="checkbox"/> Declaration Submitted with Initial Filing		OR		<input checked="" type="checkbox"/> Declaration Submitted after Initial Filing	Examiner Name	

As a below named inventor, I hereby declare that:  
My residence, post office address, and citizenship are as stated below next to my name.  
I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**METHOD AND SYSTEM FOR THE PRODUCTION OF POLYURETHANE HOT-MELT TYPE ADHESIVES**

*(Title of the invention)*

the specification of which

☐ is attached hereto

OR

☒ was filed on (MM/DD/YYYY) 6/23/2000 as United States Application Number or PCT International

Application Number PCT/EP00/05805 and was amended on (MM/DD/YYYY)  (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37 Code of Federal Regulations, § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
199 29 820.3	Germany	7/1/1999	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

☐ Additional foreign application numbers are listed on a supplemental priority sheet attached hereto:

I hereby claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date (MM/DD/YYYY)	Additional provisional application numbers are listed on a supplemental priority sheet attached hereto.
		<input type="checkbox"/>

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**DECLARATION****Page 2**

I hereby claim the benefit under Title 35, United States Code §120 of any United States application(s), or §365 of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of Title 35, United States Code §112.1, acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

**U.S. Parent  
Application Number****PCT Parent  
Number****Parent Filing Date  
(MM/DD/YYYY)****Parent Patent Number  
(if applicable)**

PCT/EP00/05805

6/23/2000

☐ Additional U.S. or PCT international application numbers are listed on a supplemental priority sheet attached hereto.

As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

☐ Firm Name  
OR

Customer  
Number or label

☒ List Attorney(s) and/or agent(s) name and registration number below:

Name	Registration Number	Name	Registration Number
Wayne C. Jaeschke	21,062		
Glenn E. J. Murphy	33,539		
Stephen D. Harper	33,243		
Kimberly R. Hild	39,224		

☐ Additional attorney(s) and/or agent(s) named on a supplemental sheet attached hereto.

Please direct all correspondence  
to:

☒ Customer  
Number

or label

00423

OR

☐ Fill in correspondence  
address below

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Address Henkel Corporation

Address 2500 Renaissance Blvd, Suite 200

City Gulph Mills

State

PA

Zip

19406

Country USA

Telephone

610-278-4926

Fax

610-278-6548

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

**Name of Sole or First Inventor:**

☐ A petition has been filed for this unsigned inventor

Given  
Name

Hans-Peter

Middle  
Initial

Family  
Name

KOHLSTADT

Suffix  
e.g. Jr.

Inventor's  
Signature

Date

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Post Office Address

City

42549 Velbert

State

Zip

Country

Germany

Applicant  
Authority

☒ Additional inventors are being named on supplemental sheet(s) attached hereto

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<b>DECLARATION</b>					<b>ADDITIONAL INVENTOR(S) Supplemental Sheet</b>				
<b>Name of Additional Joint Inventor, if any:</b>					<input type="checkbox"/> A petition has been filed for this unsigned inventor				
Given Name	Andrew	Middle Initial		Family Name	NIXON		Suffix e.g. Jr.		
Inventor's Signature					Date				
Residence: City	Meerbusch	State		Country	Germany	Citizenship	United Kingdom		
Post Office Address	Azaleenweg 28								
Post Office Address									
City	40670 Meerbusch	State		Zip		Country	Germany	Applicant Authority	
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<input type="checkbox"/> Additional inventors are being named on supplemental sheet(s) attached hereto									